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—Bulletin—

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A New Industry for Queensland.

THE opening by the Premier (Hon. E. M. Hanlon) of the new works of Messrs. A.C.F. & Shirleys Fertilizers Ltd. at Pinkenba, near Brisbane, marked the commencement in Queensland of the manufacture of superphosphate. Sugar growers will regard this with considerable interest in view of the fact that the adequate provision of phosphate is a necessity for the majority of soils used for the production of sugar cane.

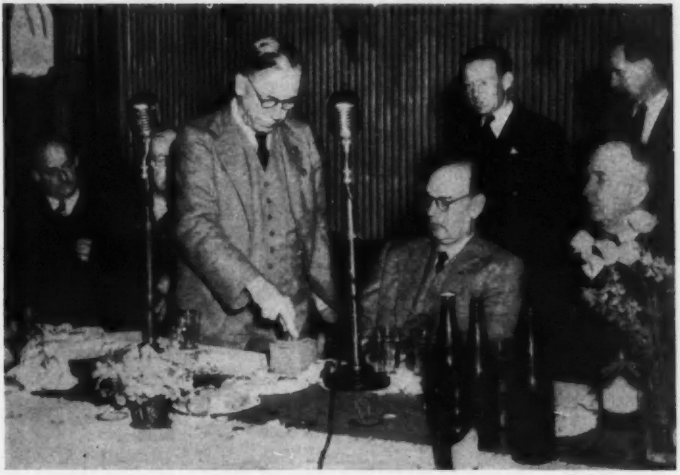

FIG. 73.—In pressing the button which set the works in motion, the Premier (Mr. Hanlon) said, "The fertilizer industry is particularly important because it is the basic industry upon which other industries are built."

[Photo.—Queensland Country Life.

Previously, Queensland was dependent upon supplies manufactured in the South, but the new plant, with a present capacity of 30,000 tons per annum, is capable of supplying the whole of our immediate requirements. The raw phosphate rock which is quarried in the Pacific Islands (Nauru and Ocean Island) will be unloaded from ships at wharves attached to the works. It will then be converted into superphosphate by the action of sulphuric acid; this action transforms the phosphate content of the rock into a water soluble state, in which condition it is immediately available to plants. When finally matured and bagged the finished product can be railed or shipped direct to the cane-growing areas.

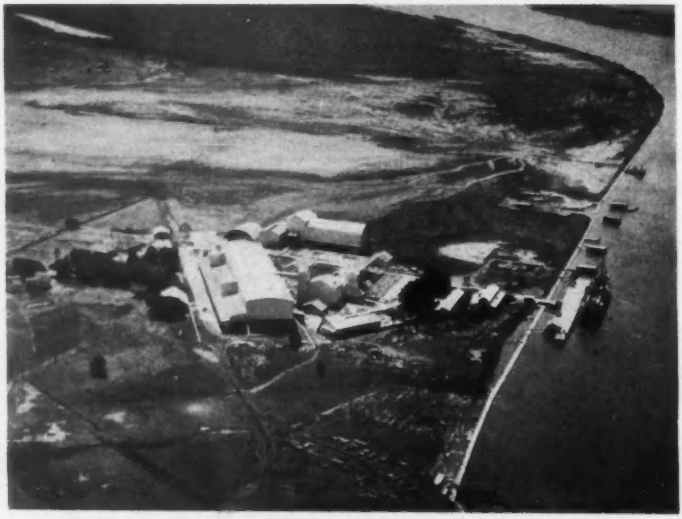

FIG. 74.—An aerial view of the new plant of Messrs. A.C.F. & Shirleys Fertilizers Ltd. at Pinkenba.
[*Photo.—Queensland Country Life.*

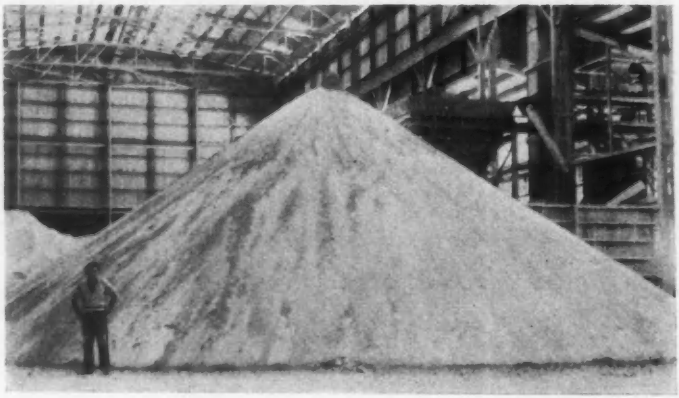

FIG. 75.—Superphosphate manufactured by the first few days' run of the new plant.
[*Photo.—Queensland Country Life.*

The saving in transport is a factor which will be particularly appreciated by growers, who, over the past few years, have been inconvenienced by the late delivery of fertilizer because of inadequate transport facilities and industrial troubles in the South. The company is to be congratulated on its initiative and enterprise, and it is hoped that the day is not far distant when similar works will be established at sugar ports in North Queensland.

—L.G.V.

A New Ratooning Implement.

By G. A. CHRISTIE.

FOR many years Mr. J. C. Emery, of Maidavale, Ayr, has been experimenting with a new type of ratooning implement, capable of handling heavy crops of trash in a very satisfactory manner. It is particularly suited to irrigated farms where "hilling up" of the cane row is usually practised, but it is considered that a satisfactory and speedy ratooning job may also be done in unirrigated areas.

The implement (Fig. 76) is designed as an attachment to a standard grubber frame, the mechanical self-lift of which is used to raise and lower the unit at headlands, and the depth of cut is adjusted by the grubber depth control. The attachment is bolted rigidly to the rear of the grubber chassis and it consists essentially of a frame carrying two discs (worn out plough discs about 24 or 25 inches in diameter are suitable), a horizontal cutting knife and two stabilising rotary coulters. The angle and position of the discs may be varied over a wide range, while the cutting knife may be raised or lowered to suit local conditions. Rotary coulters, about 20 inches in diameter, were found to be necessary to stabilise the unit against lateral movement which occurs when the discs meet with the resistance of cane stools.

FIG. 76.—The ratooning unit mounted on a standard grubber frame.

Although designed originally as a ratooning implement, it may be put to several other uses by altering the position and cutting angle of the discs. "Hilling up" and making water drains on irrigated farms are both done quickly and efficiently, and on occasions it has been used to plough out cane stools.

For ratooning, the discs are set with a left and right throw, and with one disc placed a few inches in front of the other, an overlap in the cutting edge may be obtained. Both sides of the stool are cut away, and the soil is deposited in the interspace between cane drills. The

FIG. 77.—The ratooning implement operating in trash.

horizontal cutting knife which follows the discs cuts the ridge in the centre containing the stools, which was formed by the action of the discs. By including a sharp circular coulter in front of the discs, heavy crops of trash may be partly buried in the interspaces, while more effective cover may be obtained by the addition of several coulters, which chop the trash into shorter lengths before the ratooning implement comes into operation.

For constructing water drains on headlands or through the cane fields, the overlap and cutting angle of the discs is increased and a clean, round-bottom drain, requiring no hand shovelling, is formed.

FIG. 78.—Opening the second drill in 40 tons per acre of trash.

FIG. 79.—The ratooning implement operating in field where trash has been burnt.

Two Novel Agricultural Implements.*

By G. BATES.

Introduction.

IN the struggle to keep down rising costs of production, growers are constantly on the lookout for any method which will enable them to do a particular job more easily, and this has been doubly so during the war years when farmers, like everyone else, were faced with an acute manpower shortage.

Many cane farmers have given up horse work altogether and are using high clearance tractors, which certainly have done a good job. However, there are many who still do most of their cultivation with horses and it is these who will be interested in the methods adopted by T. J. Trembath, of Babinda. With a gross area of 158 acres, this grower was faced with the problem of cultivating and keeping cane clean, with little or no man-power.

After some experimental work, Trembath had two implements patented—a "scratcher" for weeding young plant and ratoon cane, and a "scarifier" for inter-row cultivation. Used in conjunction with each other, and under conditions prevailing on his property, they have been highly successful and have kept down hoe work to a minimum. During the past two years two permanent men, together with casual labour costing £300 per annum, have performed all the farm work with the exception of cane cutting. This contrasts vividly with other years when up to 15 men have been employed chipping.

* Paper presented at the Bundaberg Conference, Q.S.S.C.T., April, 1946.

The Scarifier.

The scarifier consists of a rectangular base of wood having a number of tine bars pivotted to the bottom thereof and projecting behind the rear edge. These tine bars have straight shanks and curved ends, with feet attached. Clamping bars are provided on the base plate to hold the tine bars in position. The seven tine bars are of various lengths and are made from 1¾in. spring steel and are set in V formation. The spread of the tine bars is adjustable, according to the width of the cane row. The shafts are mounted obliquely on the top of the base plate and there are securing chains on the ends of the shafts to secure to the collar hames of the horse (Figs. 80 and 81).

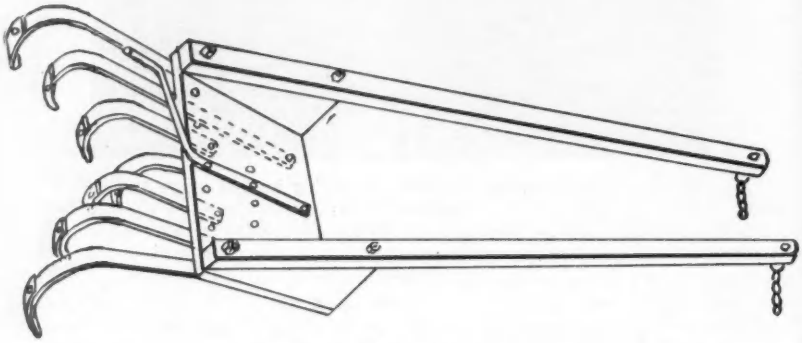

FIG. 80.—A diagram of the scarifier.

The old type of scarifier has always seemed to the writer to be a clumsy implement which even had to be held up by the operator. The one under discussion is so constructed that it follows closely on the horses' heels and balances itself, requiring no handling by the operator. It is this feature which makes the implement so valuable, for one man can handle up to five independent units, and so scarify up to five rows simultaneously. This is a distinct advantage in a climate of uncertain weather and high rainfall, where weeds grow quickly and it is necessary to make the most of fine weather. On a recent demonstration the writer witnessed a team of five units scarify a 4·7 acre block in 55 minutes, the length of the rows being 15–16 chains. Fig. 82 illustrates a group of six units. The horses are turned into the rows independently and are not even coupled together. It is customary to place the fastest horse in the middle where it can be more easily controlled with the reins. The horses are quick to learn and soon it is only necessary to start them off, the reins being trailed loosely behind.

The weight of this scarifier is in the vicinity of 100 lb. and farmers who use them say that the draught is slightly heavier than with the conventional type of scarifier. Horses, however, get a short spell at the end of each row while turning round and it is not usual to have a change of horses waiting on the headland. The depth of cultivation may be increased by using ballast which can be placed on the base plate. This, however, is seldom needed. The height of the base board is 14 inches, giving ample clearance so that the implement will not clog up with half burnt tops in the event of a bad burn. This clearance is also an

FIG. 81.—A view of the scarifier ready for operation.

FIG. 82.—Illustrating a group of six scarifiers in the field.

advantage in rough country, having large stones. For scarifying plant cane, where the centre of the drill is in the shape of a mound, the two outside tines are made longer than the others so as to cultivate close to the plant.

The Scratcher.

The scratcher consists of an angle iron frame 6 ft. 6 in. x 8 in. to which is attached a pair of shafts. At each end of this framework a set of spring tines is attached, similar to those used behind a Cotton King and other types of standard cane cleaners (Fig. 83). For weeding young plant cane six to eight tines are used, depending on the width of the open drill, but for ratoons some tines are taken out according to the density of the stooling. With this implement it is customary to use three units, each scratching two rows of stools. The weight of the implement is about 80–90 lb. and ballast is used if necessary.

FIG. 83.—Depicting the scratcher at work.

With the intelligent use of these two implements, one to clean the soil between the stools and the other for inter-row cultivation, cane can be kept clean, and hoe work reduced to a minimum. It is admitted that certain soils—such as the red volcanic soils and those of a sandy nature—lend themselves admirably to this type of implement, but they are valuable also on the heavy buff alluvials according to farmers who use them. The whole secret of success is to put these implements over the land, *before* the weeds appear, and where such a large area can be covered in so little time there is no excuse for not doing so.

Recently there have been other ideas brought forward in connection with the scratcher; one modified implement has been mounted on wheels with a lever to control depth. However, with the implement described above, one of the main features is the low capital cost, being in the vicinity of £7. This means that a farmer of moderate means may own a set without any high capital outlay. While the more elaborate implements perform work of a similar character, they are, of course, necessarily higher in price.

Hail Damage to Sugar Cane at Bundaberg.

By C. G. STORY.

AN unusually severe hailstorm accompanied by winds of high velocity swept through the Woongarra area of the Bundaberg District on the 8th March, 1946. Severe damage to property and crops was experienced in the path of this storm, which embraced an area of approximately one mile wide and extended from the Hummock to Burnett Heads. Farm buildings were blown flat; telephone lines, large trees, fruit trees, small crops and cane crops were badly damaged. Ploughed land was levelled as though flattened by a roller. In the centre of the path of the storm one house was completely unroofed and others were partially unroofed, while very few windows were left undamaged at Burnett Heads. Many farmers lost heavily from the effect of this storm. The hail at the start consisted of large, flat, jagged pieces, but these had decreased considerably in size by the end of the storm, which lasted for approximately half an hour.

FIG. 84.—Block of standover P.O.J. 2878 affected by hail. Note the sticks have been stripped of trash which is lying on the ground at the base of the stools.

Several standover blocks showing five feet of cane suffered severely and were ploughed out. Many sticks were practically stripped of tops and trash, which collected at the base of the stools (Fig. 84); on others a small amount of foliage was left at the growing point but the rest of the leaves were shredded. The fields appeared as though they had been drought stricken, trashed and abandoned. On the side of the stick exposed to hail, the rind was pitted, chewed and ringbarked by the force of the hail, and the eyes were removed (Fig. 85). Eye shooting was prominent from the undamaged eyes on these sticks. Red rot infection occurred under the damaged rind of the cane sticks, many of

which were pithy in the centre from the effects of drought. The leaves on the young cane were shredded and much of this lay as trash in the row.

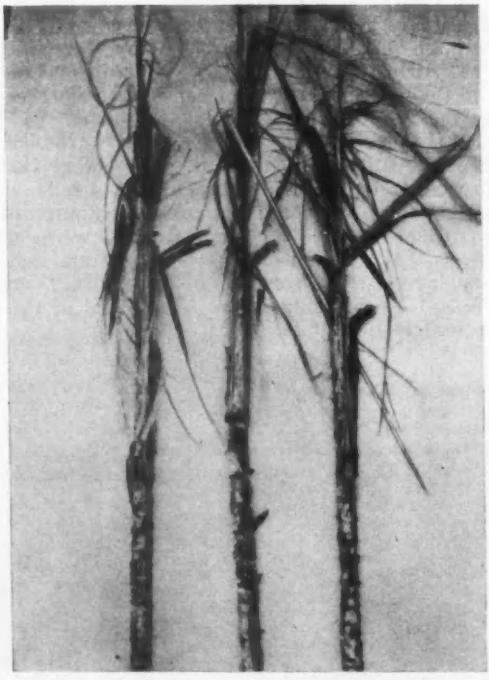

FIG. 85.—Cane sticks of standover P.O.J.2878 showing rind and bud damage by hail.

Q.48 and C.P.29/116 blocks suffered the loss of the top portion of the stick as this was broken off during the storm. Side-shooting of the eyes occurred on these sticks, and also on many which appeared undamaged, but a close examination revealed that the top portion of the sticks had been bruised by hail.

The direction of the rows of cane had an effect on the damage suffered by the crop, and a number, but not all, which were planted at right-angles to the path of the storm, suffered heavier damage than those planted parallel to its path. The varieties Q.49 and P.O.J.2878 withstood the hail damage better than Q.48 and C.P. 29/116.

Two days after the storm one farmer in the Burnett Heads area used C.P.29/116 plants from a hail damaged block and obtained an excellent strike. Some of the damaged blocks were ploughed out, but a number because of the drought conditions prevailing in the Bundaberg district were left to take a chance. A close inspection of many of these revealed that there was a large amount of green growth due to the eyes side-shooting and making rapid growth at the expense of the stick.

At the time of the hailstorm young shoots were growing from the bottom of the stools, as a result of the early March rain. In the case of those stools which were topped these shoots made fair growth.

A serious aftermath of the hailstorm in this area was the widespread infection of downy mildew. The rapid growth of the side shoots which appeared on damaged cane under warm humid conditions, was ideal for the development and spread of this disease. The position must be watched carefully because strong measures will be required to control the disease.

Resistance of Eros to Grub Attack.

The pronounced increase in grub numbers accompanied by widespread damage to cane in the Innisfail district during the autumn of 1946 provided an opportunity to observe the relative resistance of Eros to grub attack.

Lack of major damage to Eros suggests that either its slow early growth does not attract egg-laying beetles, or else it is able to withstand grub attack to a greater degree than other varieties. Consequently, growers whose farms are situated in the known grubby areas would be well advised to plant a proportion of their crops with this variety.

Although no grub counts were made to determine whether the beetles preferred to lay eggs in adjoining varieties rather than in Eros plots, it has been noted during the past two years that, in comparable plantings, Eros showed greater resistance to grubs than Trojan and Clark's Seedling in schist-alluvial soils; Trojan, S.J.4, and Clark's Seedling in red volcanic soil; and Q.44 in alluvial soil.

H.G.K.

A Soil Erosion Control Experiment in the Isis District.*

BY L. G. VALLANCE.

Introduction.

A SERIOUS problem in the utilization of hill sides for sugar cane culture is the gradual decline in production brought about by the downhill migration of surface soil. In the Isis area there is abundant evidence of considerable deterioration in soil fertility on the steeper slopes of many of the hillside farms which are typical of this district. Some of these slopes have been so affected by erosion that the point is now being reached beyond which they can no longer be profitably planted to cane. Fortunately, however, only a few small marginal areas have, as yet, reached this stage, and even on these it would appear that the wartime scarcity of fertilizer has also contributed to their abandonment. In general, the amount of damage which has already been done is revealed by the poor growth of cane on the upper portions of the slopes as compared with the much more vigorous growth at the bottom. Figs. 86 and 87 show a typical eroded hillside in the vicinity of Childers, which is the business centre of the Isis district. In the middle distance (Fig. 86) is a slope of 10 to 16 per cent. gradient which has been considerably affected by "sheet" and "finger" erosion. The block of cane (Fig. 87) immediately joins this on the right. The upper portion of this block shows the thin stand of cane characteristic of washed soils. The light patches above this indicate the exposed subsoil.

Climate and Soils of the District.

Rainfall figures recorded at Childers are given in the table below, and these indicate a well marked seasonal distribution, with a summer maximum. The average precipitation per rainy day is also highest in the summer months, rising to a maximum of 0·73 inches in January. Unfortunately no detailed information is available regarding the intensity of the rainfall. However, local experience indicates that late spring and early summer storms of three to four inches per hour are not uncommon. Since harvesting is usually completed by the end of December and most of the land is being prepared for January-February planting, the soil is particularly susceptible to erosion at this period.

RAINFALL DATA FOR CHILDERS.

—	Years	Jan.	Feb.	Mar.	Apr.	May	J'ne	July	Aug.	Sep.	Oct.	Nov	Dec	Annual.
Rainfall (points)	43	727	669	465	282	207	245	170	119	179	276	274	571	4,184
No. Wet Days	43	10	11	11	9	7	7	6	4	4	6	7	11	—

*Paper presented at the Bundaberg Conference, Q.S.S.C.T., April, 1946.

FIG. 86.

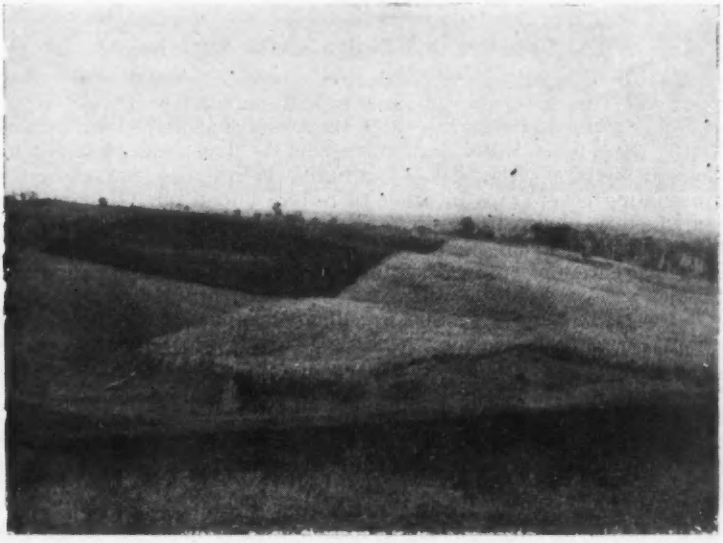

FIG. 87.

FIGS. 86 and 87.—General view of typical eroded hillside area, showing fallow land affected by finger erosion and patchy stand of cane on eroded slope.

The soils of the district are for the most part deep, red basaltic loams. There is no sharp line of demarcation between the surface and subsoil, but a gradual transition occurs and the clay content increases with depth. The depth of surface soil varies considerably with the topography, and ranges from four to six inches on non-eroded hillsides, and from ten to fifteen inches on the flat country. The colour is usually dark red-brown or chocolate. The texture is best described as loam. It is underlain by a clay loam or light clay subsoil which is lighter red-brown in colour. This also varies in depth with the topography and may be two to four feet deep on hillsides and eight to twelve feet deep on the lower lying areas.

These soils, under virgin conditions, were highly fertile scrub soils. They were well supplied with humus and in consequence these highly ferruginuous soils possessed a very favourable crumb structure. In addition to their excellent physical condition they were initially well supplied with mineral plant-foods. The attraction of such fertile soils proved irresistible to the early settlers and even the steepest slopes were brought into cultivation. These hillsides have now been under continuous cropping to cane for a period of some 50 to 60 years. During this time much of the organic matter has disappeared and this, together with the constant mechanical effect of cultivating implements, has resulted in a marked depreciation of the original favourable structure. In consequence the soil is now less absorbent of moisture and more readily puddled. The soil immediately below plough depth has become pounded down and much of its permeability has been lost. Such conditions greatly increase erodibility and an accelerated rate of erosion is inevitable under the present methods of cultivation.

The Objective and Design of the Experiment.

The problem, therefore, is to arrest this loss of surface soil in order to prevent further decline in productivity on land which can still be profitably planted. To do this there are several factors to be considered. Firstly, there is the restriction imposed by the assignment system which allows the grower very little opportunity to rest his land under soil-rejuvenating cover-crops in order to restore humus, and thus maintain a satisfactory physical condition. Fortunately, however, the nature of the growth of the cane plant itself is such that it assists in many ways in the prevention of erosion. For instance, because of its ratooning habit it is not necessary for the soil to be brought frequently to a fine tilth, as is the case with crops that are planted annually. Again, the cane rapidly covers in and forms a dense leaf canopy which protects the soil from the full force of torrential downpours. The large number of stalks per stool has a definite filtering effect which impedes and reduces the velocity of run-off water. On the debit side, however, is the fact that, because of the late summer planting of the variety P.O.J. 2878, the soil is usually least protected and most vulnerable during the dangerous period of summer storms.

Furthermore, any system of erosion control must be so designed as not to interfere with cultivation and harvesting methods to such an extent that the cost of production is prohibitively increased. Therefore any terraces, channels, and drainways constructed must be of such

a type as to allow unrestricted movement of the fairly heavy mechanical equipment now in general use throughout the district. Consideration must be given to harvesting requirements, particularly as regards the use of portable tramlines.

The Site.

An area of approximately seven acres, located about one mile from Childers, was generously made available for experimental purposes by one of the leading growers of the district. This had been cultivated to cane for approximately 40 years. No rotation to other crops had been practised, with the exception of a few cover-crops grown for two to three months between harvesting and the next planting. The slope is typical of the steeper hillside country, having a maximum gradient of 16 per cent. Some "sheet" and "finger" erosion has affected the area but, given satisfactory weather conditions and adequate fertilization, the land is still capable of producing reasonably satisfactory crops of

FIG. 88.—Showing general layout of experiment.

cane. The soil is a red basaltic loam and may be regarded as fairly representative. A portion of the area covering approximately four and one-quarter acres is bounded by two natural gullies or waterways. On this a series of broad, shallow ditches following the contour and about 50 feet apart have been constructed. When planted the cane rows will run parallel to these. The remaining two and three-quarter acres is to be used for comparison and will be planted in the manner normally used in the district, i.e., the cane rows will be off level and may have gradients varying from 5 to 10 per cent. Soil samples from the area have been submitted to analysis, as a result of which the land was given a dressing of lime at the rate of one ton per acre and will be fertilized at planting with Sugar Bureau Mixture No. 3 (1·75-10-25) at the rate of 400 lb. per acre.

The Nichols Terrace.

The basic design of the experiment is the series of broad, shallow ditches following the contour (Fig. 88). These are flanked on the downhill side by a mound or ridge of earth. The complete unit, i.e., ditch plus mound, is referred to as a "terrace." Eight of these terraces were constructed, all of which lead into a main outlet channel running down the eastern and northern boundaries of the field. The sketch plan given in Fig. 89 shows the layout of the terraces in relation to the outlet channel. The function of the terrace is, of course, to divert run-off water into the outlet before it has obtained sufficient velocity to erode the loose surface soil from the cultivated area between terraces. No. 1 terrace occupies the higher portion of the field and there is a vertical drop of approximately 50 feet from No. 1 to No. 8. In order to ensure that the water would move along the terrace channel and so pass into the outlet channel the terraces were given a slight fall as shown in the following table:—

FALL PER 100 FEET OF TERRACE.

0-100	feet of	terrace—	nil grade
100-200	„	„	—1½in. „
200-300	„	„	—2in. „
300-400	„	„	—2½in. „
400-500	„	„	—3in. „

This slight gradient is sufficient to prevent water building up and finally overtopping the terrace but is not great enough to permit rapid movement and consequent scouring in the channel itself.

The type of terrace constructed was primarily of the Nichols type rather than the broad-based Mangum terrace. In explanation of the essential difference between the two types it may be pointed out that the Mangum is fundamentally a broad mound of soil resting on the original soil surface. It is built up by throwing the soil inwards from both sides. There is no definite waterway on the uphill side and the mound itself is depended upon to hold and divert the water along the contour. In the Nichols terrace a broad, shallow channel is cut and all the soil removed therefrom is thrown *downhill* to form the mound. This ensures that the maximum amount of water is carried in the channel. This channel is, of course, below the original soil surface, and should the flanking mound break during heavy rainfall the channel itself still drains away a considerable volume of water. Because of this, the Nichols type of terrace is particularly suitable for areas subject to rainfall of high intensity. The construction of the terraces was carried out with a No. 11 speed patrol road grader. This is a heavy unit of eight tons in weight, with a 60 horsepower Diesel motor and a twelve-foot blade. Some scoop and shovel work was necessary at the ends of terraces, particularly at the junction with the main outlet channel.

The completed terrace is shown in Fig. 90. The area of cross-section of the waterway averages approximately three square feet. Whether this is sufficient under the prevailing conditions of run-off and rainfall remains to be seen. Indeed one of the main objectives of this present experiment is to determine the carrying capacity required. It may also be pointed out that, in this work, because of the steep slope, the mound itself is relied upon to provide most of the carrying capacity.

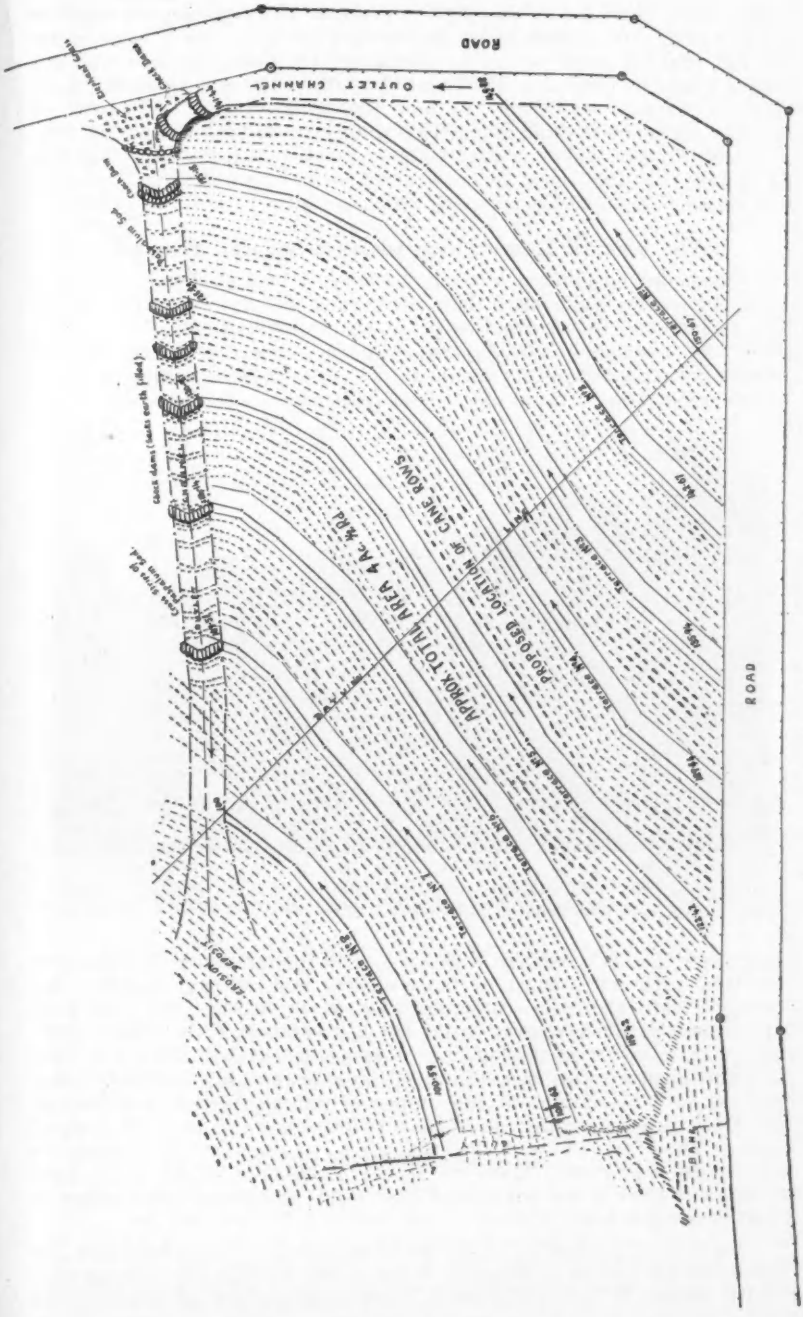

FIG. 89.—Sketch plan of terraced area.

This is not ideal but is inevitable on slopes of such steep gradient as 16 per cent. On a lesser slope, say five per cent., the carrying capacity of the channel itself would be much greater and practically all the water would be carried in the channel, which is the true function of the Nichols terrace. However, the high degree of slope of this piece of land is probably the maximum with which it will be necessary to deal, and should these experimental terraces prove satisfactory on this field it is felt that they may be constructed with reasonable confidence on the slopes of eight to ten per cent. which are more typical of the district.

The Vertical Interval and Distance between Terraces.

It should be pointed out that because of lack of data on the rate of water movement through these porous red soils the experiment under discussion must be regarded as being purely exploratory. In deciding upon the distance required between terraces there are many factors which must be taken into account. The maximum distance must not

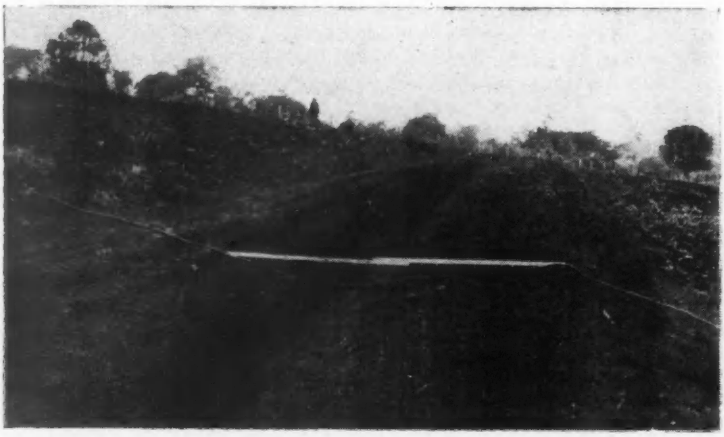

FIG. 90.—The finished terrace. The staff is nine feet long and is perfectly horizontal. The greatest depth is ten inches.

be greater than is consistent with safety and the minimum distance must be fixed with due regard to the economic and cultural aspect. The terraces were therefore constructed so as to average not less than approximately 50 feet apart on the steepest portions of the field, i.e., the equivalent of about 11 rows of cane at 4½ feet intervals. As each terrace, i.e., the channel plus mound, occupies approximately 18 feet which will not be planted to cane, it is apparent that the terracing of land at the above intervals results in the loss of three rows in every 11 rows of cane. This loss of over 25 per cent. of production acreage is admittedly important. However, in the interests of safety in the light of overseas work it was considered inadvisable to increase the distance in this particular trial.

In fixing the location of the terraces, therefore, a straight line was taken downhill so as to traverse as far as was possible the steepest part of the slope. Fifty feet intervals were then marked off at which the

terraces would intersect this line. The levels taken at these points gave the vertical interval or drop between adjacent terraces. These, when re-checked after the completion of terracing, gave the vertical intervals as shown in the following table:—

VERTICAL INTERVALS BETWEEN TERRACES.

Between	Terrace	No.	1	and	No.	2 = 8·0	feet.
"	"	"	2	"	"	3 = 6·7	"
"	"	"	3	"	"	4 = 6·5	"
"	"	"	4	"	"	5 = 7·0	"
"	"	"	5	"	"	6 = 7·0	"
"	"	"	6	"	"	7 = 7·8	"
"	"	"	7	"	"	8 = 7·0	"

As minor variations in slope occurred throughout the field there were, of course, variations in the distance between terraces. However, in general they are 55 feet apart with a minimum of approximately 40 feet and maximum of 70 feet. It is expected that systematic

FIG. 91.—Showing check dams for stabilisation of main outlet channel (uphill view).

observations on the behaviour of the terraces with the above horizontal and vertical intervals will provide valuable information from which practical recommendations may be evolved for general application to the district as a whole.

The Main Outlet Channel.

Because of the restricted area available the terraces were of limited length, varying from 200 to 430 feet. It was therefore decided to carry the run-off water along the complete length of the terrace, i.e., from one side of the field to the other. This was done in order to obtain all possible information regarding the behaviour of the water in the

channels. Therefore all the run-off from the field is diverted by means of the terraces into one main outlet channel. As it might reasonably be expected that during heavy rainfall a considerable body of water would be moving down this outlet drain, it was necessary that the drain should be adequately protected. If this were not done, rapid gully erosion might occur in the outlet channel resulting in a considerable increase in depth. Immediately this took place the terrace channels themselves would start to cut back from the point where the water spills over into the deeper outlet. This is fatal in any erosion control system, the field ultimately becoming dissected by a series of uncontrollable canyons. Therefore it must be realised that the formation of the outlet channel is exceedingly important and experience has shown that very often the success of the whole scheme depends upon the satisfactory functioning of the main outlet. The channel constructed was in the form of a broad ditch some 16 feet wide with a shallow V bottom. The gradient of this varied from about 14 per cent. over the first 150 feet to about 10 per cent. at 150 to 300 feet, gradually decreasing till at approximately 900 feet it ran into a wide valley built up with erosion-deposited material. This latter area will be planted with cane which will receive the run-off water in such a greatly dispersed condition that no trouble is envisaged regarding its disposal, particularly in view of the permeable nature of this deep built-up soil.

In soil erosion control work it is now generally recognized practice to form the main outlet channel about twelve months before the channels are constructed. This enables it to be planted with grass or other soil-holding plants in order that it may become well sodded and protected before any water is diverted into it. This precaution, however, was not possible in the present experiment without delaying the scheme for an appreciable period. In view of the exploratory nature of the trial, it was decided to protect this drainway by artificial methods. At the end of each terrace a check dam was constructed across the main outlet by placing fertilizer bags (160 lb. bags) filled with soil in arrow formation pointing down hill (Figs. 91 and 92). The location of these in relation to the terraces and also that of some intermediate dams are shown in Fig. 89. The bags were let into the soil to prevent movement and undercutting. Paspalum sods were planted beneath the uphill edges. Between each check dam a double row of these sods was also planted right across the outlet, at intervals of six to eight feet. These were watered in to ensure a sucessful strike. A small vulnerable point above the bend of the channel, which received run-off water from a road, was planted with elephant grass and also bolstered with a check dam (Fig. 93).

Cultivation of the Area and Maintenance.

It should always be remembered that the construction of terraces alone should not be relied upon completely to control soil-washing in cultivated areas. Contoured cultivation is also necessary, and, in the case of sugar cane, the fact that the planting rows may conveniently be run on the contour is of considerable value in reducing run-off. In this experiment, the cane will be planted parallel to the terraces, the first row in each inter-terrace area being along the downhill margin of the bank of the terrace immediately above. Since the slope is not uniform the width of the strip between any two terraces varies throughout the length, and in consequence, therefore, some short rows are unavoidable on the lower side. In order to avoid damage to the terrace channels

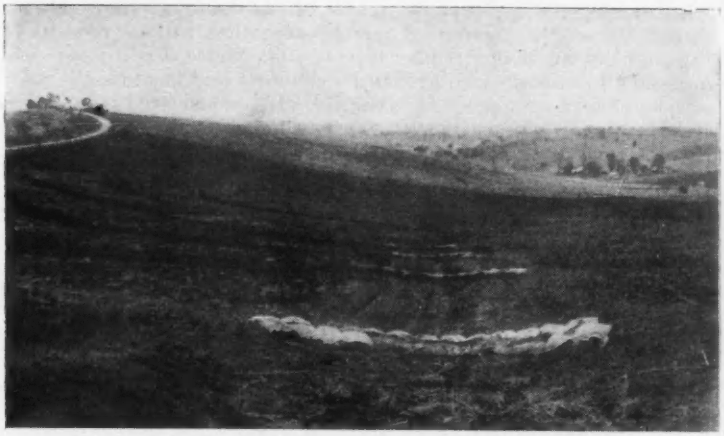

FIG. 92.—Downhill view of check dams in main outlet channel.

and mounds, it has been decided that cane will not be planted within nine feet of the centre of any channel. As previously pointed out, this will result in the loss of about three rows of cane in eleven. This is undesirable, but necessary in order to determine the stability and required carrying capacity of this type of terrace. Actually, because of the broad, shallow nature of channel and mound, it would be possible to plant cane, as far as soil suitability is concerned, to within about 4½ feet of the centre of the channel. This would mean that only one row of cane would be eliminated. Sufficient information may be available at the time of ratooning to warrant an experimental planting of the two additional rows.

FIG. 93.—Protection, by means of elephant grass and check dam, of vulnerable point where main outlet channel changes direction.

Because of the exploratory nature of the trial, no information is yet available on the amount of maintenance that will be required on terraces set out in this particular type of soil. Since it will presumably be necessary to control weed-growth on channels and mounds, the use of some type of scraper weeder is envisaged. It is considered possible that a blade mounted on a scarifier frame may be adapted to destroy weeds and at the same time carry out any reshaping that may be necessary.

Soil Management.*

BY W. J. S. SLOAN.

Introduction.

DURING recent years the problems of soil erosion and loss of soil fertility have received increased attention, and publicity has been given to criticism of modern methods of cultivation and the extensive use of artificial fertilizers. In general, would-be agricultural reformers claim that the salvation of agriculture lies in the adoption of "back to nature" methods, the abandonment of inorganic fertilizers, and a revision of methods of soil preparation and crop cultivation. There is no monoculture in nature, that is, the growing of single crops in pure culture; mixed culture is the rule. Cultivation tends to destroy the fertility reserve in the soil which under natural conditions is built up in the form of humus in the upper layers of the soil by the activities of micro-organisms, earthworms, and the like, from the residues of plant and animal life. Therefore, critics assert that stable agriculture and successful food production can only be secured by imitating as closely as possible the processes which operate in nature. However, the improvement and maintenance of the soil humus content is not an easy problem and this paper is presented for the purpose of briefly examining methods advocated as substitutes for present-day practices by several writers.

Maintenance of Soil Humus in Cultivated Land.

Howard (2) believes that the ideal method is to make humus in specially prepared compost heaps from plant residues and the dung and urine of farm animals and then return it to the fields. Ploughing, thorough drainage and sub-soiling, he says, are all essential for aeration of the soil, but he condemns the continued expansion of the machine in agriculture because manure from animals is necessary for correct humus production. Apart from improvement in the soil structure and the addition of plant nutrients, the benefits of specially prepared humus are claimed to include the creation of a favourable soil environment for the development of mycorrhizas on the roots of crop plants. This fungal root association is suggested as the basis of healthy plant growth and resistance to pests and disease. Howard (3) and Sykes (7) claim further that the health of stock is improved when they are grazed and fed on crops produced by the use of humus. Moreover, Howard believes that the health of the populace generally would be raised if a keener appreciation of the use of properly prepared humus could be developed in farming communities. Biodynamic farmers (6) are in agreement

*Paper presented at the Bundaberg Conference, Q.S.S.C.T., April, 1946.

with the greater part of Howard's thesis, with even greater emphasis on the need for mixed farming, and the use of farm animal manures in humus production. The basis of their argument is that the soil must be fed, not the plant. A fertile soil is rich in organic matter and is alive by virtue of the fact that it contains enormous populations of micro-organisms. If the latter are fed with properly prepared humus, healthy plant growth and high quality produce are a natural sequence. Biodynamic farmers hold extremist views with regard to humus preparation, and believe that manure and compost heaps should be treated with certain mysterious starters prepared by fermenting at specific depths in the soil special herbs and plants in close contact with certain parts of animals. Emphasis is laid particularly on the value of humus prepared from animal manure and urine in the belief that such humus contains special growth-promoting substances.

A variation has been introduced by Faulkner (1) in a popular, but unscientific, book which has received considerable publicity. Humus production and the imitation of nature's methods are the main theme, but the use of the mouldboard plough is violently opposed because the complete burial of organic matter is in sharp contrast to the rotting down of organic matter on the soil surface which takes place under natural conditions. Soil preparation and crop cultivation therefore should be limited to the top few inches of the soil. Faulkner believes that the drainage problem is accentuated by the deep burial of organic matter, because rain water would be absorbed by the soil and not accumulate in hollows if the soil surface was maintained in an open granular condition by the incorporation of plant wastes in the top few inches only. Unlike the writers previously mentioned, he does not define any method for preparing humus under special conditions off the field, the emphasis being laid on sheet composting in the field itself by chopping up green manure crops and plant residues with disc harrows or similar implements in a manner comparable to the operation known as stubble mulching.

Although it has received greater prominence in recent years, the value of soil humus has long been recognized. No modern agriculturist of repute has failed to appreciate the merits of organic matter in soil conservation and crop production and to advocate consistently the maintenance and improvement of the humus content of cultivated soil. However, the artificiality of agriculture is a problem which cannot be overcome. While the need for rotations is recognized, there is no alternative to monoculture over large areas of arable land. Under natural conditions the law is survival of the fittest, but under cultivation the aim is to prevent the growth of all plants other than the main crop. Sowing fields with mixed cultures of crop plants would create chaotic conditions in cultivation and harvesting. Clearing and fencing land, row cropping, the development of new strains of crop plants, and so on, are obviously unnatural, but very necessary to maintain the volume of primary production.

The need for maintaining humus at an adequate level in cultivated soil is undeniable, but methods must be both practical and economic. Preparation of compost heaps under special conditions would require a considerable expense in labour and add to costs of production. Moreover, the machine has come to stay in agriculture and the number of farm animals will steadily decline in the future on farms mainly devoted to the cultivation of a single crop. The claim that well prepared humus

confers on the soil special properties of significance to growth of crops, apart from its mineral nutrient content and the beneficial effect on soil structure, has not been satisfactorily proved. There is strong evidence that mycorrhizas are associated with vigorous growth of certain forest trees, but Laycock (4) investigating the effects of endotrophic mycorrhizas on cacao found that they tended to be more prolfic on unthrifty trees, indicating that they were not of importance in the nutrition of the cacao tree. Prepared plant hormones are used for improving the rooting of cuttings, but there is no evidence that vitamins or other specific growth-promoting substances which may be present in organic manures increase crop yields or have any special nutrient effect.

The intelligent application of green manuring, trash conservation, and grassland rotation where possible, offer the best solution to the cane farmer in maintaining and improving the soil humus content. Green manuring, although it does not add greatly to the humus content, does supply valuable nitrogen and in addition protects the soil from unfavourable weather conditions and arrests the loss of humus. Crop residues provide the best source from which the cane farmer can make an appreciable addition to soil organic matter. Trash conservation is probably of more importance on some soils than others.

Unfortunately, the war years have brought about an increase in the burning of cane before harvesting and large quantities of organic matter which might otherwise have been utilized for soil improvement have been lost. However, the cane roots and the trash which survives burning, particularly from well fertilized crops, do add an appreciable amount of organic matter when ploughed in. Molasses and mud or press cake are other excellent sources of organic matter where they are available to farmers. The grassing of idle land for a few years is undoubtedly one of the most important methods of raising the organic matter status of the soil. The grass roots also promote a desirable crumb structure favouring the formation of good tilth and, moreover, the grassland rotation assists to lower the weed population.

The Role of Inorganic Fertilizers.

Antagonism to the use of so-called "artificial inorganic fertilizers" is unscientific and not based on sound experimental data. Fertilizers like potash, guano, lime and sodium nitrate, are derived from natural deposits and are no more artificial than the mineral particles of the soil. Inorganic fertilizers in general are not harmful to the physical and chemical condition of the soil if applied intelligently. It is true that the continued use of sulphate of ammonia may increase soil acidity, but this is readily checked by periodic applications of lime. Sodium nitrate may also have an adverse effect on heavy soils, but this can be avoided by using other nitrogenous fertilizers for this type of soil. Indiscriminate use of fertilizers without correct soil management to maintain good physical condition may give disappointing results, but on the other hand additions of organic matter low in plant nutrients may be equally unsatisfactory unless supplemented with inorganic fertilizers. The population of micro-organisms is higher in soils treated with organic manures, but the normal rates of application of inorganic fertilizers have not been proved to be harmful to these organisms. Nor has it been shown that the resistance of plants to pests and diseases and the quality of produce are lowered by the use of balanced inorganic fertilizers.

There is no doubt that organic matter is of great value in arresting soil erosion, but there is no evidence that the correct use of balanced fertilizers has directly caused it on a large scale. In the case of some unskilled farmers, artificial fertilizers may have been a contributory cause insofar as they influenced neglect of soil management. However, inorganic fertilizers have been very useful on eroded soils in helping the establishment of soil stabilizing plants and thus preventing further erosion. Their use in cane produces larger crops and makes available a greater quantity of trash and roots for incorporation in the soil. However, there is no question that inorganic fertilizers must be used intelligently, otherwise results may be disappointing. Balanced fertilizing is required and there is definitely a limit to rate of application, above which gains are not economic. Consistent success is only achieved when fertilizing is combined with soil management to maintain a good structural condition of the soil.

Soil Preparation in Relation to Crop Residue Management.

Criticism of modern agricultural methods is essentially based on the question whether land should be cultivated deeply and the organic matter turned under, or whether soil preparation should be limited to chopping up weeds and crop residues in the top two or three inches of the soil without any disturbance of the lower layers. Burial of the greater portion of the organic matter in land preparation is necessary to provide a good seed bed, help weed control, enable efficient planting, cultivation, irrigation, and harvesting in rows with machines, and to facilitate the decomposition of organic matter to humus. Moreover, deep ploughing to leave a lumpy surface promotes penetration of rain and thus reduces erosion. If organic matter fails to rot down before planting, the growing crop will often exhibit nitrogen starvation which, unless corrected, may adversely affect yields. This possibility is increased where the organic matter is merely incorporated in a shallow layer of surface soil. The elimination of ploughing would cheapen seed bed preparation but cultivation costs would be higher. Practice has shown that inadequate preparation aggravates the weed problem. Nutgrass, couch, and summer grasses are more difficult to control unless the land is well cultivated, particularly if rain should occur at or just after ploughing. Rotary tillage is claimed by some as the solution to the problem of eliminating the need for ploughing, but it is doubtful if consistently good results can be obtained by this means alone. Alternation with deeper ploughing or grubbing or subsoiling would be required periodically to break up the hard pan which continued use of rotary tillers will produce in cultivated land. A recent paper by Matthews (5) gives interesting information on the value of various ways of incorporating crop residues in the soil for dry land crop production. This constitutes a summary of results obtained over a number of years in experiments at field stations in the Great Plains and Columbia River basin of U.S.A. Small grain crops, chiefly wheat, were grown and the soil treatments included leaving all the residues on the surface, leaving a portion of the residues on the surface, and completely burying the residues. Yields were much the same for all soil treatments. The conclusion was that the need for leaving crop residues on the surface was largely dependent on a long-term view of erosion rather than the expectation of materially influencing current yields.

Conclusion.

Dogmatic opinions in agriculture are unwise and usually not in the best interests of the farmers and the community generally. Experience has taught that most soils and farms need their own individual treatment. Given certain well-founded principles, the farmer's own knowledge must supply the details for the management of his land to the best advantage. Nevertheless, the views discussed above, while lacking evidence from sound experimental work to support their extravagant claims, do contain a useful warning to farmers. It is a matter of everyday observation that where trash is left on the surface rainfall absorption by the soil is better, run-off is thereby reduced, and the rate of erosion slowed down. Uncovered, bare soils are liable to serious deterioration in tropical and sub-tropical areas of high rainfall. It is true that some farmers powder the soil unnecessarily by over-cultivation, and some tend to rely too much on inorganic fertilizers without due regard for the structural condition of the soil. The commonsense view is to combine the use of inorganic fertilizers, properly balanced for the soil under consideration, with soil conservation by the use of green manuring and the return of organic matter to the soil. Fortunately, the cane farmer is using a crop which has many advantages. There is a prolific growth of roots, the soil is protected by a leafy canopy during the period of high temperatures and heavy rains, and run-off and erosion are checked by the fibrous roots and stools.

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A Further Reminder About Cane Growers' Varietal Returns.

Growers are again reminded that the return showing varieties of sugar cane harvested and planted during 1946 will shortly have to be filled in by every cane farmer. Not only must information on the varieties grown for milling be included but the return should also show the areas of all cane cut for plants and fodder, whether used on the farm or sold, together with any experimental varieties in trials or propagation plots. Three copies of the special form are supplied to each farmer by the mill, and he should fill in each one. Two copies are then forwarded to the mill by 31st March, and the other kept by the farmer for his own future reference. The miller has to submit one copy of each return to the Bureau.

D.R.L.S.

Varietal Trials, 1945 and 1946 Seasons.

By W. J. S. SLOAN.

DURING the war years the field staff was seriously depleted and those officers who remained with the Bureau were burdened with additional duties, with the result that the number of field trials conducted by field officers decreased considerably. However, the opportunity is taken here to inform growers of the varietal trials which have been carried through and harvested during 1945 and 1946. In all, 16 varietal trials are summarized, comprising nine from the northern districts, two from the central districts, and five from the southern districts. Included in the last-mentioned are two summaries which were made available from the records of the Fairymead Sugar Co., to whom we are indebted for permission to publish them.

The 1945-46 growing season was generally unfavourable, particularly from March till harvest in all the major districts. In consequence, all the varietal trials harvested in 1946 from unirrigated land suffered severely from drought, whilst frost damage aggravated the position in the southern areas. Under such abnormal conditions, results from the trials must be treated with reserve. For example, low C.C.S. data in these trials may not represent a true index of the average performance of a variety over a number of years.

In the northern districts, Q.44 again demonstrated its excellent ratooning ability, even under harsh conditions. During the floods of early 1946 its strong rooting system enabled it to stand up well in flooded areas; and, although blown over in places, no damage due to breaking was observed. Its habit of making early growth was clearly demonstrated during the last season in the Mulgrave area, where the latter end of the season was very dry. As a result the variety was heavily drawn upon for planting material. Indications are that Q.44 will be a useful variety for the poorer soil types and low-lying lands.

Both Trojan and Eros, two seedlings raised by the Colonial Sugar Refining Co., performed creditably. The planting of the former appears certain to extend considerably on the medium and better class soil types. Trojan stood up very well to cyclonic winds and remained erect and apparently unaffected by flooding. Best results appear to be achieved in the North when the variety is planted early and harvested late. Eros showed resistance to severe grub injury, which would recommend it to growers with suitable land in grub-infested areas.

The introduced Hawaiian variety, 32-8560, did not impress. This variety has given outstanding results in Hawaii, where it was bred, and its performance in this country has been watched with interest. Experience has shown that its germination is slow and poor under wet conditions. The stalks are thin, and it shows a late sprawling habit which results in poor cover permitting heavy growth of weeds. The growing points are brittle and snap easily under wind pressure and

the percentage of damaged sticks was high in trials during the early 1946 cyclone. Indications are that it is not a good cutting cane and not a suitable variety for northern canefields.

In the Mackay area, Q.50 showed to advantage in the two trials at Mackay and Sarina respectively. Its drought resistance and higher C.C.S. make it more attractive than Q.28, and there is little doubt that it will displace the latter variety on a number of soil types in this area. Red rot appeared in Q.50 during the later stages of harvesting at Mackay, following on the very harsh conditions which had prevailed from early March onwards, but it is not expected that this disease will be of importance in the variety in normal seasons.

In the Bundaberg area Q.49 and Q.47 appear to be promising canes, particularly the former. It is a good striker, has a stout barrel and good C.C.S., and may prove to be a useful standover type.

The frost resistance trials in the Moreton area gave interesting information. From the point of view of the purpose of the trials, the severe winter of 1946 provided an excellent test. Both Q.42 and Q.28 showed to distinct advantage, the higher C.C.S. of the former being a favourable characteristic. Q.42 is not a reliable, strong ratooner, but its performance in this respect in the Moreton area has been satisfactory to date. In addition to its ability to withstand frost, Q.42 has also shown good drought resistance during the past season and consequently the variety has received increased attention in the Maryborough area. Q.28 has displayed good vigour and stooling in the southern districts, and it is anticipated that plantings of this variety will be extended.

The Bureau is continually supplying new varieties to the industry per medium of the Sugar Experiment Stations. Moreover, promising new varieties in other countries are introduced for trial after passing through strict quarantine tests. Before general distribution of a variety can be carried out, it is necessary for the Bureau to know of the variety's performance over a wide range of conditions. To achieve this, the field officers must necessarily depend on the cooperation and good will of growers throughout the State to accept and faithfully carry out varietal trials. Without this cooperation, the collection of accurate data over a wide range of conditions is slow and progress is retarded. Replicated trials requiring careful harvesting are often disliked by many growers, but it is for the benefit of growers in particular and the industry in general that they should extend active cooperation to field officers in setting out trials.

During the next season further trials of new seedlings are planned. In an endeavour to decrease the inconvenience to growers accepting varietal trials and to lessen the risk of an entire trial being lost either by some climatic freak, or misunderstanding at harvest, or similar cause, it is proposed to introduce a new type of field arrangement for varietal trials. Under this system two replications of each variety will be placed on two or more farms of the same soil type and comparable cultivation methods. Several soil types will be used wherever possible so that all the trial varieties will be tested out under a wide range of conditions.

Mr. T. Tolentini's Farm, Mossman.

Soil Type.—Granitic Alluvial. **Nature of Crop.**—Plant Cane.
Age of Crop.—14½ months. **Harvested.**—August, 1946.

SUMMARY OF CROP YIELDS.

Variety.	Cane per Acre.	C.C.S. in Cane.
	Tons.	Per cent.
Eros	28·2	**17·6**
Trojan	**28·7**	16·2
P.O.J.2878	23·5	15·7

DISCUSSION.

Germination in all varieties was good and no misses were supplied, although P.O.J.2878 was slightly inferior to the other two varieties. Trojan germinated even more slowly than Eros. In its early growth the latter variety showed more pronounced sprawling habit than P.O.J.2878. Eros arrowed almost completely while P.O.J.2878 also arrowed freely. No arrows appeared in Trojan. All varieties made good uniform growth and no grub damage appeared in the block. As indicated by the crop yields, both Trojan and Eros were superior to P.O.J.2878 in yields of sugar per acre.

Mrs. P. J. French's Farm, Edmonton.

Soil Type.—Brown Schist. **Nature of Crop.**—First Ratoon.
Age of Crop.—14 months. **Harvested.**—September, 1945.

SUMMARY OF CROP YIELDS.

Variety.	Plant Cane.		First Ratoon Cane.	
	Cane per Acre.	C.C.S. in Cane.	Cane per Acre.	C.C.S. in Cane.
	Tons.	Per cent.	Tons.	Per cent.
Comus	**41·0**	14·3	13·8	18·0
Q.44	36·6	11·8	**20·0**	18·8
Q.10	33·8	15·2	8·9	17·9
H.Q.426	33·5	**16·6**	7·8	**19·3**
Q.13	32·0	15·7	7·3	18·9

DISCUSSION.

All varieties yielded well in the plant crop, having been planted on land which had been in fallow for two years, with Comus showing out to better advantage than the others. Grub damage occurred in the plant crop and after cutting, an attempt was made to consolidate the loose stools by running the wheels of the tractor over the rows. With the exception of Q.44 and Comus, the ratoons, particularly Q.13, came away poorly, although weather conditions following cutting were favourable. For the most part, subsequent growth was poor. At harvest of the ratoons, Q.44 was outstanding, Comus being the only other cane really fit for harvest.

Messrs. F. & C. Provera's Farm, Kamma.

Soil Type.—Grey Schist. **Nature of Crop.**—First Ratoon.
Age of Crop.—11½ months. **Harvested.**—September, 1945.

SUMMARY OF CROP YIELDS.

—	Plant Crop.		First Ratoon Crop.	
	Cane per Acre.	C.C.S. in Cane.	Cane per Acre.	C.C.S. in Cane.
	Tons.	Per cent.	Tons.	Per cent.
Comus	21·7	17·0	10·2	16·5
Cato	20·2	17·2	9·3	18·2
H.Q.426	17·8	19·1	8·7	18·6
Q.10	17·3	17·4	5·9	14·8
Q.13	16·9	18·2	6·7	17·3

DISCUSSION.

In the plant crop, Comus had the best germination and impressed most. On the whole, however, the trial made poor growth and fared no better in the ratoons. The ratoons lacked vigour and no variety made much cane. Under the unfavourable conditions of this trial, Comus and Cato appeared to be better than the other varieties, but no reliable conclusions can be drawn from the results.

Mr. A. F. Koppen's Farm, Mena Creek, South Johnstone.

Soil Type.—Red Volcanic. **Nature of Crop.**—Plant Cane.
Age of Crop.—14½ months. **Harvested.**—October, 1945.

SUMMARY OF CROP YIELDS.

Variety.	Cane per Acre.	C.C.S. in Cane.
	Tons.	Per cent.
Trojan	37·1	15·1
Badila	32·5	15·4
Eros	32·7	15·0

DISCUSSION.

All varieties gave good germination, but Eros required more supplying than the others. Growth and stooling were good in all, but cover was deficient in both Trojan and Eros and weeds were more prevalent in plots of these varieties at harvest. Eros arrowed profusely and partial arrowing also occurred in Trojan. Trojan gave the best yield, with little to choose between Badila and Eros.

Mr. J. Campagnola's Farm, Mourilyan.

Soil Type.—Sand.
Age of Crop.—15 months.
Nature of Crop.—Plant Cane.
Harvested.—October, 1945.

SUMMARY OF CROP YIELDS.

Variety.	Cane per Acre.	C.C.S. in Cane.
	Tons.	Per cent.
Eros	**19·3**	15·7
Trojan	18·3	16·0
H.Q.426	18·0	**16·1**

DISCUSSION.

Good germination was obtained in all plots and no supplying was required. Stooling was fair in all varieties, but growth generally was poor with H.Q.426 producing better cover than the other two varieties. Arrowing occurred in Eros. Yield differences were negligible.

Mr. E. Zaffonato's Farm, Moresby, Mourilyan.

Soil Type.—Alluvial.
Age of Crop.—13 months.
Nature of Crop.—Plant Cane.
Harvested.—June, 1946.

SUMMARY OF CROP YIELDS.

Variety.	Cane per Acre.	C.C.S. in Cane.
	Tons.	Per cent.
Eros	**27·3**	12·5
Q.44	22·5	11·9
32-8560	19·1	**14·0**

DISCUSSION.

Germination was good in Q.44 and the Hawaiian seedling 32-8560, but Eros was patchy and required more supplying than the others. Growth and stooling was fairly good in all, but cover was particularly deficient in 32-8560 and heavy weed growth was present in plots of this variety at harvest. Cyclonic winds in February badly pushed the cane across the row interspaces in all plots. Over 15 per cent. of the stalks were damaged in 32-8560, but injury was negligible in the other two varieties. Grub damage was apparent in Q.44 plots but Eros showed a distinct degree of resistance. The performance of 32-8560 did not indicate that it would be a success in this area; cover was poor, sticks were hard but brittle and it was disliked by cutters. Eros was the most impressive variety in this trial.

Mr. P. Garrone's Farm, Mourilyan.

Soil Type.—Schist Loam.
Age of Crop.—14 months.
Nature of Crop.—Plant Cane.
Harvested.—July, 1946.

SUMMARY OF CROP YIELDS.

Variety.	Cane per Acre.	C.C.S. in Cane.
	Tons.	Per cent.
Eros	19·7	16·1
Badila	15·9	16·3
32-8560	11·4	15·6

DISCUSSION.

Although more supplies were required in 32-8560 than in the other varieties, germination in all plots was good. Thirty-eight per cent. of the stalks in 32-8560 were damaged during a cyclonic disturbance in February, 1946, but injury was negligible in Eros and Badila. Growth and vigour of 32-8560 were inferior and its cover was very poor, the plots showing much weed and grass when harvested; it was also a hard cutting cane. Cover was deficient in Eros but this variety gave the best all-round performance.

Messrs. S. J. & S. W. French's Farm, Tully.

Soil Type.—Gravel.
Age of Crop.—13 months.
Nature of Crop.—Plant Cane.
Harvested.—September, 1945.

SUMMARY OF CROP YIELDS.

Variety.	Cane per Acre.	C.C.S. in Cane.
	Tons.	Per cent.
Trojan	35·8	15·5
Eros	27·1	16·1
Badila	25·8	15·6

DISCUSSION.

Germination was good in all varieties, but Eros was slow. Growth, stooling, and cover were good in all varieties. Trojan out-yielded the other two, and its yield of 5½ tons of C.C.S. was a very good performance in what was a poor season.

Messrs. Frazer Bros.' Farm, Tully.

Soil Type.—Alluvial.
Nature of Crop.—Plant Cane.
Age of Crop.—13 months.
Harvested.—July, 1946.

SUMMARY OF CROP YIELDS.

Variety.	Cane per Acre.	C.C.S. in Cane.
	Tons.	Per cent.
Badila	25·5	**16·8**
Eros	**27·9**	14·7
32-8560	19·7	16·3

DISCUSSION.

Germination was good in Badila and Eros, but inferior in 32-8560. Growth was fairly good in all varieties, but cover was deficient in both Eros and 32-8560, particularly the latter, and these plots showed much grass and weeds at harvest. This variety also proved to be hard to cut, and a poor cane for loading because of bends in the stalk. Badila and Eros both out-yielded 32-8560 by a considerable margin in terms of sugar per acre.

Mr. H. Ivers's Farm, Rosella, Mackay.

Soil Type.—Forest sandy loam.
Nature of Crop.—Plant Cane.
Age of Crop.—14 months.
Harvested.—October, 1946.

SUMMARY OF CROP YIELDS.

Variety.	Cane per Acre.	C.C.S. in Cane.
	Tons.	Per cent.
Q.50	**35·7**	**14·8**
A.147	25·1	14·7
Trojan	26·4	13·5
A.130	32·0	11·3
Q.28	21·9	13·7

DISCUSSION.

In common with other trials in the Mackay area, this varietal trial experienced harsh growing conditions from March till harvest. All varieties deteriorated rapidly during the prolonged dry period, and dead and pithy material was common throughout the trial, particularly in plots of A.130. Q.50 was outstanding and yielded better than other varieties by a good margin. Q.50, a seedling obtained from the cross P.O.J.2725 x Co.290, is regarded as being of distinct promise.

Trojan performed well under soil conditions which were not particularly suitable to this variety. On the other hand, Q.28 made poor growth and under the conditions of this trial appeared to be more susceptible to drought than any of the other four varieties. A.130, a seedling bred on the Mackay Sugar Experiment Station, gave a good yield despite the large amount of dead cane present in the plots at harvest, but the C.C.S. was distinctly lower than the others.

Mr. W. J. McKinley's Farm, Sarina.

Soil Type.—Alluvial sandy loam. **Nature of Crop.**—Plant Cane.
Age of Crop.—11½ months. **Harvested.**—August, 1946.

SUMMARY OF CROP YIELDS.

Variety.	Cane per Acre.	C.C.S. in Cane.
	Tons.	Per cent.
Q.50	**28·0**	9·3
Q.45	24·1	**9·9**
P.O.J.2878	24·8	9·3
Comus	25·5	8·0
Trojan	25·6	7·8

DISCUSSION.

Up to March, 1946, all varieties made excellent growth but thereafter adverse weather conditions caused rapid deterioration. Consequently the trial had to be harvested at 11½ months. Comus and Q.45 suffered particularly badly, and a percentage of each variety was unmillable and was left in the field. The upper internodes of the other three varieties were also withered and were commencing to become pithy when harvested. Red rot was prevalent in both Q.50 and Comus. Q.50 appeared to withstand the low soil moisture conditions best of all varieties although slight lodging occurred in two plots. The low C.C.S. values cannot be taken as indicative of the inherent quality of these varieties.

Mr. W. Truscott's Farm, South Kalkie, Bundaberg.

Soil Type.—Forest red sandy loam. **Nature of Crop.**—Plant Cane.
Age of Crop.—14 months. **Harvested.**—October, 1946.

SUMMARY OF CROP YIELDS.

Variety.	Cane per Acre.	C.C.S. in Cane.
	Tons.	Per cent.
Q.49	**22·6**	**16·1**
Q.47	**22·6**	14·9
Q.48	22·1	14·1
P.O.J.2878	21·1	10·0

DISCUSSION.

The strike was good in all varieties except Q.47, in which it was only fair. Q.48 and Q.49 germinated quicker than P.O.J.2878, while Q.47 was definitely backward compared to the other three varieties. The trial was irrigated seven times in all. Several heavy frosts checked growth, but the "Q" varieties withstood injury better than P.O.J.2878. Cane yield differences were small, but Q.49 gave the best all-round performance; frost damage undoubtedly affected the C.C.S. content of P.O.J.2878.

Fairymead Plantation, Block 3W, Trial No. 1.

Soil Type.—Grey clay loam.
Age of Crop.—13 months.
Nature of Crop.—Plant Cane.
Harvested.—September, 1946.

SUMMARY OF CROP YIELDS.

Variety.	Cane per Acre.	C.C.S. in Cane.
	Tons.	Per cent.
Q.25	35·6	**13·5**
Q.49	34·1	13·0
C.P.29/116	**39·3**	11·2
Co.290	33·1	12·3
Q.48	34·7	10·9

DISCUSSION.

This was an irrigated trial. There were no significant differences between varieties as regards tons of cane per acre, but in terms of tons of sugar per acre, Q.25, Q.49, and C.P.29/116 performed better than the other varieties. Q.25 has been a reliable yielder in the plant crop, but its ratooning ability is inferior to C.P.29/116 and Q.49 and it is anticipated that the latter two varieties will surpass it in the ratoons. Q.49, a Bureau seedling from the cross P.O.J.2878 and C.O.290, appears to be resistant to Fiji disease and it is expected to become a useful variety in the Bundaberg district.

Fairymead Plantation, Block 3W, Trial No. 2.

Soil Type.—Grey clay loam.
Age of Crop.—12½ months.
Nature of Crop.—Plant Cane.
Harvested.—September, 1946.

SUMMARY OF CROP YIELDS.

Variety.	Cane per Acre.	C.C.S. in Cane.
	Tons.	Per cent.
Q.47	31·9	**13·6**
Q.25	31·5	**13·6**
C.P.29/116	**35·5**	11·7
Q.49	32·3	11·7
Co.290	31·8	11·6
Q.48	32·5	10·9

DISCUSSION.

This was also an irrigated trial. On the basis of tons of cane per acre, C.P.29/116 significantly out-yielded all the other varieties, but in terms of sugar per acre Q.47, Q.25, and CP.29/116 were approximately equal and were superior to the other three varieties. The trial made good growth, but the overall C.C.S. figures were not impressive. Q.47, a Bureau seedling from the cross Co.290 x P.O.J.2878, possesses good vigour, and is commercially resistant to Fiji disease and indications are that it is a good C.C.S. cane. The ratoon yield data will be awaited with interest for the further evaluation of these varieties.

Mr. W. J. Ramm's Farm, Maroochy River, Yandina.

Soil Type.—Brown peaty loam. **Nature of Crop.**—Plant Cane.
Age of Crop.—11 months. **Harvested.**—August, 1946.

SUMMARY OF CROP YIELDS.

Variety.	Cane per Acre.	C.C.S. in Cane.
	Tons.	Per cent.
C.P.29/116	**38·9**	8·1
Q.42	23·4	**10·7**
Q.28	34·2	8·3
Co.290	33·4	7·1
Q.48	27·0	7·3

DISCUSSION.

This trial was designed primarily for testing the resistance of these varieties to direct frost injury and to examine the extent of deterioration following such injury. C.P.29/116 germinated fastest, followed by Q.28 and Q.48, then Co.290 and Q.42 in that order. A heavy frost in early July damaged all varieties. On foliage symptoms Q.42 appeared to be worst; Q.28, Q.48, and Co.290 were damaged equally, while C.P.29/116 displayed least injury. Subsequent examination of the growing points, however, showed that Q.42 and Q.28 were superior to the other varieties. In harvesting, the cane was cut back 12"–14" from the growing point to improve the overall C.C.S. On a basis of net monetary return C P.29/116, Q.42, and Q.28 were approximately the same and further evaluation of these varieties will depend upon the ratoon yield data.

Messrs. Walden Bros.' Farm, Paynter's Creek, Nambour.

Soil Type.—Sandy loam alluvial. **Nature of Crop.**—Plant Cane.
Age of Crop.—10 months. **Harvested.**—July, 1946.

SUMMARY OF CROP YIELDS.

Variety.	Cane per Acre.	C.C.S. in Cane.
	Tons.	Per cent.
Q.42	30·3	**10·5**
Q.28	36·1	7·1
Co.290	31·6	6·3
Q.48	36·1	5·7
C.P.29/116	**38·7**	5·5

DISCUSSION.

This was also a frost resistance trial similar to that carried out on W. J. Ramm's farm, Yandina. Germination was good in all plots and no supplying was required. The trial area was covered with 3" of water during heavy rain in March, 1946, one plot of Co.290 particularly suffering from water-logging. A heavy frost in early July killed the tops of all varieties, Q.48 being worst affected. C.P.29/116 showed least injury in the leaf, but was more damaged internally. Q.42 and Q.28 both withstood frost injury better than the other varieties. The tops were not cut back far enough in harvesting and very low C.C.S. figures were recorded in Co.290, Q.48, and C.P.29/116. Q.42 was outstandingly the best variety under the conditions of the trial, while Q.28 also performed creditably.

Conference at Tully of Cane Pest and Disease Control Boards.

By R. W. MUNGOMERY.

AFTER a lapse of five years, due to difficulties associated with the recent war, the annual conference of Cane Pest and Disease Control Boards was resumed at Tully recently, where a very successful meeting was held. In all, 42 delegates attended, representing 14 Cane Pest and Disease Control Boards from Mossman to Mackay.

Delegates to the conference were: Messrs. E. J. O'Brien and A. R. Taylor (Mossman), F. Ferguson and F. M. Barton (Hambledon), J. S. Clarke and P. Volp (Mulgrave), W. J. Ryan and R. M. Barry (Babinda), E. Blundell, W. D. Davies and C. K. Simpson (Goondi), W. Richardson, W. L. Poustie, A. H. Reichardt, G. Wilson (South Johnstone), E. R. Campbell, J. W. Horsford, E. S. Edgerton, E. H. Fox (Mourilyan), J. A. Winter, J. Harney, S. B. Best, G. F. Dafforn, P. Byrne, R. Smith (Tully), W. J. Lyons, K. R. Gard (Macknade), E. D. Ross, W. C. Fraser (Victoria), W. E. G. Smith, W. D. McCloskey (Invicta, South of Townsville), M. T. Norris, F. W. Reading (Lower Burdekin), H. V. Hanson, W. F. Klaka (Inkerman), J. Trevaskis (Mackay), R. W. Mungomery, W. A. McDougall, J. H. Buzacott, G. Bates, H. G. Knust, G. A. Christie (Bureau Representatives).

Apologies for non-attendance were received from Messrs. J. C. Collier, F. H. Stevens (Mackay), and P. Sayers (Lower Burdekin).

On behalf of the Minister for Agriculture and Stock, the Advisory Board, and the Director of Sugar Experiment Stations, Mr. Mungomery welcomed delegates to the eighth conference, and expressed pleasure at seeing such a large and representative gathering, despite the fact that the conference had, of necessity, to be held this year during the crushing season. He then called for nominations for chairman of the conference. Mr. J. A. Winter, chairman of the Tully Cane Pest and Disease Control Board, was unanimously elected to preside over conference deliberations, and he subsequently took charge of the meeting.

Items appearing on the agenda which came up for discussion during the course of the conference included such matters as wallaby control, the rat problem, the cane grub pest, the compilation of data on pest and disease incidence, and cockatoo damage to cane crops. As opportunity permits, it is proposed to reprint in the Quarterly Bulletin, for the benefit of canegrowers generally, some of the papers submitted by various delegates.

In his paper Mr. Reading described the use of the Beagle hound for combating the wallaby pest. The efficacy of this method of control, as well as that of poisoning, was discussed from different angles, and whilst it was agreed that both had definite value, several delegates stressed their confidence in wire netting as being the most effective means of guaranteeing reasonable security from these pests. It was, therefore, resolved to approach the Commonwealth Government with a view to securing an early release of supplies of wire netting, pig netting, and barbed wire for the purpose of preventing further extensive damage by such pests.

Mr. McDougall (Mackay) and Mr. Wilson (South Johnstone) discussed various aspects of the rat problem and new poisons that were being tested for rat control. Sodium fluoracetate was regarded as possessing distinct promise, but because of its extremely dangerous nature it was doubtful whether it would be wise to press for the release of this poison for general use. However, every avenue was being explored to secure additional supplies for further experimentation, and it was anticipated that some firms would have small supplies available for such work in the near future.

In connection with cane grub fumigation, Mr. Wilson detailed suggested modifications and improvements in the lubrication of the Blundell knapsack fumigant injector.

Mr. Volp (Mulgrave) stated his experiences in respect of varietal reaction to cane grub infestation in the Mulgrave area, whilst considerable interest centred around a paper by Mr. Buzacott (Meringa) in regard to some of the newer insecticides that were recently tested for cane grub control. Reference was made by several delegates to the spectacular control achieved with "gammexane" in a small exploratory trial on the Meringa Sugar Experiment Station, and it was intimated that further experimental work was now under way to determine its value against grubs already established in canefields, and also to ascertain whether this chemical has any serious deleterious effects on cane growth.

Mr. McDougall stressed the necessity for compiling data which would give, in future years, authentic information on the extent and degree of pest infestations, losses incurred, and money expended in different avenues of pest control. It was resolved that individual Pest Boards submit full details and that provision be made in the minutes of the conference for including the tabulated information so collected.

The question of the powers and duties of Cane Pest and Disease Control Boards, and the matter of subsidies on poisons, fumigants, and equipment, &c., were discussed at some length. The chairman informed the conference that this had been the subject of representations by the Queensland Cane Growers' Council to the Minister for Agriculture and Stock, while Mr. Taylor (Mossman) stated that in a recent deputation the Minister had assured his Board that the matter would be submitted to Cabinet. In view of this, it was decided to defer further action until the outcome of these representations was made known.

It was unanimously decided that Innisfail be the venue of the next year's conference. At the conclusion, delegates expressed their appreciation to Mr. Byrne, Miss Barry, the Tully River District Cane Growers' Executive, the Tully Cane Pest and Disease Control Board, and the directors and manager of the Tully Mill who had cooperated in entertaining them and conducting them on a tour of inspection of the Tully Mill and district.

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